AMENDMENTS TO THE CLAIMS

The following listing of the claims will replace all prior versions and listings of the claims in this application. Where claims have been amended or canceled, such amendments and cancellations are done without prejudice, waiver or disclaimer to the claimed subject matter. The applicant and/or assignee reserves the right to claim this subject matter and other disclosed subject matter in a continuing application:

Listing of Claims:

1. (Currently Amended) A method for rendering a digital object, the method comprising:

receiving information defining a digital object, wherein the digital object comprises a computer-generated three-dimensional surface geometry, and wherein the information is sufficient for defining modeled light reflected from the surface geometry of the digital object in a modeled light environment;

generating a two-dimensional light intensity matrix, each matrix entry mapped to a unique surface element of the surface geometry, each matrix entry being a lumel representing a modeled light intensity correlated to a mapped unique surface element of the digital object;

blurring the light intensity matrix, thereby producing a blurred matrix; and

rendering the digital object, using matrix entries from the blurred matrix to determine pixel intensity values for the digital object.

2. (Original) The method of claim 1, wherein the generating step further comprises computing a modeled light intensity for each matrix entry using detailed skin topographical data.

3. (Original) The method of claim 2, wherein the generating step further comprises processing the detailed skin topographical data in the form of a bump map.

4. (Original) The method of claim 2, further comprising obtaining the detailed skin topographical data by measuring a three-dimensional structure of a skin surface sample.

5. (Original) The method of claim 1, wherein the rendering step further comprises using color values from a color map to determine pixel color values for the digital object.

6. (Original) The method of claim 1, wherein the rendering step further comprises determining the pixel intensity values by mip-mapping the blurred light intensity matrix.

7. (Original) The method of claim 6, further comprising generating a color map comprising a two-dimensional matrix, wherein each matrix entry of the color map represents a color of the unique surface element of the digital object.

8. (Original) The method of claim 1, wherein the blurring step further comprises convolving the light intensity matrix.

9. (Original) The method of claim 1, wherein the blurring step further comprises processing the light intensity matrix using a Fast Fourier Transform function.

10. (Previously presented) The method of claim 1, wherein the blurring step further comprises executing a blurring algorithm of the form $e^{-(x^2+y^2)/\sigma}$, where x and y are the horizontal and vertical widths, respectively, of the blur kernel in number of lumels, e is the base of the natural logarithm, and σ is a spreading parameter.

11. (Original) The method of claim 1, wherein the generating step further comprises generating a light intensity matrix for each of three color separation channels.

12. (Original) The method of claim 11, wherein the blurring step further comprises blurring the light intensity map for each channel according to the general expression

$\boldsymbol{I}_{x,y} = \boldsymbol{V}_{x,y} \cdot \boldsymbol{I}_{0,0}$;

where $\boldsymbol{I}_{x,y}$ is a blurred value of each $(x,y)_{th}$ lumel, $\boldsymbol{V}_{x,y}$ is an attenuation factor for each $(x,y)_{th}$ defining a blur kernel having a predetermined width, and $\boldsymbol{I}_{0,0}$ is an unblurred value of each $(x,y)_{th}$ lumel of the light intensity map.

13. (Currently Amended) The method of claim 12, wherein the blurring step further comprises computing the blur kernel

$$V_{x,y} = 1 \Big/ \left(\sqrt{x^2 + y^2} + 1\right)^{P_{RGB}} \qquad \cancel{\text{(Eq. 2)}}$$

separately for each channel, wherein x and y are computed over the range of $-h_{RGB}$ to h_{RGB}, h_{RGB} is a corresponding h_R, h_G, or h_B halfwidth of the blur kernel for each channel, and P_{RGB} is a corresponding P_R, P_G, or P_B power factor for each channel.

14. (Original) The method of claim 12, wherein the blurring step further comprises computing $V_{x,y}$ using a corresponding value of P_R, P_G, and P_B for each respective color channel within a range of 2 to 4.

15. (Original) The method of claim 12, wherein the blurring step further comprises computing $V_{x,y}$ over a halfwidth h_{RGB} determined by

$$h_{RGB} = \frac{K_{RGB} \cdot W}{a} + b$$

where *W* is the width or largest dimension of the lightmap, in number of lumels, K_{RGB} is a corresponding kernel size factor K_R, K_G, and K_B for each respective color channel within a range of 5 to 20, *a* is within a range of 1000 to 2000, and *b* is within a range of 0 to 1.

16. (Currently Amended) A system for rendering a digital object, the system comprising a memory holding a two-dimensional light intensity matrix, each matrix entry mapped to a unique surface element of ~~the~~ a computer-generated digital object and being a lumel representing a modeled light intensity correlated to a mapped unique surface element of the digital object, wherein the light intensity matrix is a blurred matrix; and

a processor operatively coupled to the memory, whereby the processor determines pixel intensity values for rendering the digital object using matrix entries from the blurred matrix.

17. (Original) The system of claim 16, wherein the processor determines values of each matrix entry of the blurred matrix using an unblurred light intensity matrix and a blurring algorithm.

18. (Original) The system of claim 16, wherein the memory further holds a two-dimensional color map of the digital object, and wherein the processor determines pixel color values for rendering the digital object using the color map.

19. (Original) The system of claim 16, wherein the memory further holds a two-dimensional bump map, the bump map describing fine surface variation between surfaces of the digital object and a modeled 3D geometry of the digital object.

20. (Original) The system of claim 19, wherein the processor calculates a two-dimensional unblurred light intensity matrix using the bump map and a modeled light environment.

21. (New) A method for approximating subsurface scattering of an object to render the object comprising:

generating a first matrix of light intensity values each representing diffuse reflection from a standard surface;

blurring the light intensity values;

generating pixel values of an image of the object using the blurred light intensity values; and

storing in a memory pixel values of the image.

22. (New) The method of claim 21 further comprising:

generating a second matrix of values representing specular surface reflection from the object;

wherein generating pixel values of an image of the object further comprises using the second matrix of values representing specular surface reflection from the object.

23. (New) A system for approximating subsurface scattering of an object to render the object comprising:

a computer memory storing a blurred two dimensional matrix of light intensity values each representing diffuse reflection from a standard surface; and

a processing unit in communication with the computer memory, wherein the processing unit is programmed with instructions for rendering the object using the blurred two dimensional matrix of light intensity values to determine pixel values.

24. (New) The system of claim 23 further comprising:

a computer memory storing a two dimensional matrix of values representing specular surface reflection from the object;

wherein the processing unit is programmed with instructions for rendering the object using the two dimensional color map.

25. (New) The system of claim 24, wherein the processing unit is programmed with instructions for generating the blurred two dimensional light map from the two dimensional light map.